MASS. ED 21.2: M382/50/2001/Fall/Grade 10/
MAT

UMASS/AMHERST
312066 0277 6958 5

GOVERMENT DOCUMENTS
COLLECTION

JUL 16 2003

University of Massachusetts
Depository Copy

MASSACHUSETTS DEPARTMENT OF EDUCATION

MCAS

MASSACHUSETTS COMPREHENSIVE ASSESSMENT SYSTEM

Release of Fall 2001 Test Items

Mathematics

Grade 10 Retest

January 2002
Massachusetts Department of Education

Massachusetts Department of Education

This document was prepared by the Massachusetts Department of Education
Dr. David P. Driscoll, Commissioner of Education

Board of Education Members

James A. Peyser, Chairman, Dorchester

Roberta R. Schaefer, Vice-Chairperson, Worcester

Charles D. Baker, Swampscott

J. Richard Crowley, Andover

Judith I. Gill, Chancellor, Higher Education, Boston

William K. Irwin, Jr., Wilmington

James Madden, Randolph, Chair, Student Advisory Council

Abigail M. Thernstrom, Lexington

Henry M. Thomas, III, Springfield

David P. Driscoll, Commissioner
and Secretary to the Board

The Massachusetts Department of Education, an Affirmative Action employer, is committed to ensuring that all of its programs and facilities are accessible to all members of the public. We do not discriminate on the basis of age, color, disability, national origin, race, religion, sex, or sexual orientation.

Copyright © 2002 Massachusetts Department of Education
Permission is hereby granted to copy any or all parts of this document for non-commercial educational purposes. Please credit the "Massachusetts Department of Education."

This document printed on recycled paper

350 Main Street, Malden, Massachusetts 02148-5023 #781-338-3000

Commissioner's Foreword

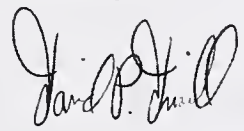
Dear Colleagues:

The Massachusetts Comprehensive Assessment System (MCAS) is the Commonwealth's statewide testing program for public school students, developed in response to the Education Reform Law of 1993. MCAS is based exclusively on the rigorous academic learning standards contained in the Massachusetts *Curriculum Frameworks.* These *Frameworks* and the MCAS program have been developed with the direct and active involvement of educators from across Massachusetts and with the support of the Board of Education. Together, the *Frameworks* and MCAS are designed to raise the academic achievement of all students in the Commonwealth.

The purpose of this document is to share with educators and the public all of the test items on which student results are based. The release of these items provides considerable information regarding the kinds of knowledge and skills that students are expected to demonstrate on the MCAS tests to earn the high school competency determination. Local educators are encouraged to use this document together with their school's *Test Item Analysis Reports* to identify strengths and weaknesses in curriculum and instruction, and to guide the changes necessary to more effectively serve students.

Thank you for your support as we work together to strengthen education for our students in Massachusetts.

Sincerely,



David P. Driscoll

Document Purpose and Structure

Purpose

The purpose of this document is to share with educators and the public the test items from the December 2001 Grade 10 Retests. All test items administered during the December Retests were common test items.

Release of these items is intended to provide additional information regarding the kinds of knowledge and skills that students are expected to demonstrate on MCAS in order to meet the high school competency determination. Local educators will be able to use this information to identify strengths and weaknesses in their curriculum and instruction, and to guide the changes necessary to more effectively meet their students' needs.

This document is also intended to be used by school and district personnel as a companion document to the *Test Item Analysis Reports.* Each school receives a December Retest *Test Item Analysis Report* for English Language Arts and Mathematics. These reports provide data generated from student responses. Each report lists, for the school receiving the report, the names of all enrolled students in that grade, and shows how each student answered each item in that content area. The report identifies each item as multiple-choice, open-response, short-answer, or a writing prompt, and identifies the item's MCAS reporting category. Item numbers in this document correlate directly to the "Item Numbers" in the *Test Item Analysis Reports.*

This document lists the MCAS reporting category for each item as it is referenced in that content area's *Test Item Analysis Report.*

Structure

The test questions from the December Retests are released by the Department in four separate documents:

- *Release of Fall 2001 Test Items: English Language Arts Composition, Grade 10 Retest* (2002)
- *Release of Fall 2001 Test Items: English Language Arts Sessions 1 & 2, Grade 10 Retest* (2002)
- *Release of Fall 2001 Test Items: English Language Arts Session 3, Grade 10 Retest* (2002)
- *Release of Fall 2001 Test Items: Mathematics, Grade 10 Retest* (2002)

The subsequent section of each document contains information pertaining to the content area tested.

The last page in each document lists the Massachusetts *Curriculum Framework* learning standards that are assessed by MCAS in that content area. Also, the last page identifies the MCAS reporting categories under which test results in that content area are reported to schools and districts. Correct answers for all multiple-choice and short-answer questions are indicated on this page. Scoring rubrics for open-response questions will be posted to the Department's website later this winter.

Responses to open-response items and compositions written in response to writing prompts are scored individually. An overview of procedures for scoring these responses and compositions is presented in the MCAS fact sheet, "Facts on Scoring of Student Answers to Open-Response Questions and Writing Prompts," which is available on the Department's Internet site at **www.doe.mass.edu/mcas.** Scoring procedures are also explained further in the MCAS document, *Guide to Interpreting the 2001 MCAS Reports for Schools and Districts.*

Materials in this document are shown in the same order in which they were presented in test booklets. The heading for each group of items indicates the test session within which those items appeared in the Test Booklets. Directions in this document are shown as they were presented in the Test Booklets. Page numbers in this document indicate the page numbers as they appeared in the Test Booklets.

Materials are not formatted exactly as they appeared in Student Test Booklets. For instance, in order to present items most efficiently in this document, the following modifications have been made:

- Some fonts and/or font sizes have been changed and/or reduced.
- Some graphics have been reduced in size from their appearance in Student Test Booklets; however, they maintain the same proportions in each case.

Copies of the December Retest Mathematics Reference Sheets used by students during MCAS Mathematics test sessions are provided in the following document:

- *Release of Fall 2001 Test Items: Mathematics, Grade 10 Retest* (2002)

Mathematics, Grade 10

Test Sessions

The MCAS Mathematics test is administered in two separate test sessions. Each session included multiple-choice and open-response questions. Session 1 also included short-answer questions.

Reference Materials and Tools

During testing, each grade 10 student was provided with a **Mathematics Reference Sheet**. A sample of the Grade 10 Mathematics Reference Sheet is included the end of this document. During Session 2, each student was allowed to use a personal calculator while answering test questions. If any student could not provide his or her own calculator with at least four functions and a square root key, one was provided to that student for use during those sessions. Calculator use was not allowed during Session 1. No other reference tools or materials were allowed during any grade 10 Retest Mathematics testing sessions.

Cross-Reference Information

The last page of *Release of Fall 2001 Test Items: Mathematics, Grade 10 Retest* (2002) indicates each item's MCAS reporting category and the *Framework* substrand that contains the learning standards assessed by the item.

HOW TO ANSWER OPEN-RESPONSE QUESTIONS

Be sure to

- read all parts of each question carefully.
- make each response as clear, complete, and accurate as you can.
- check your answers.

Mathematics

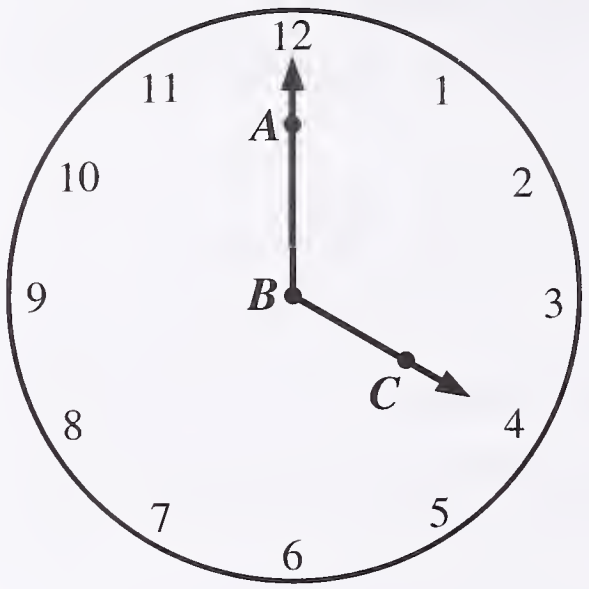
SESSION 1

*You may **not** use a calculator during this session.*

DIRECTIONS

This session contains fourteen multiple-choice questions, four short answer, and three open-response questions. Mark your answers to these questions in the spaces provided on pages 2 through 5 of your Student Answer Booklet.

1 The figure below shows angle *ABC* formed by the hands of the clock at 4 o'clock.



What is the measure of angle *ABC*?

A. 60°

B. 90°

C. 120°

D. 150°

2 Which of the following statements about $\sqrt{121}$ is **not** true?

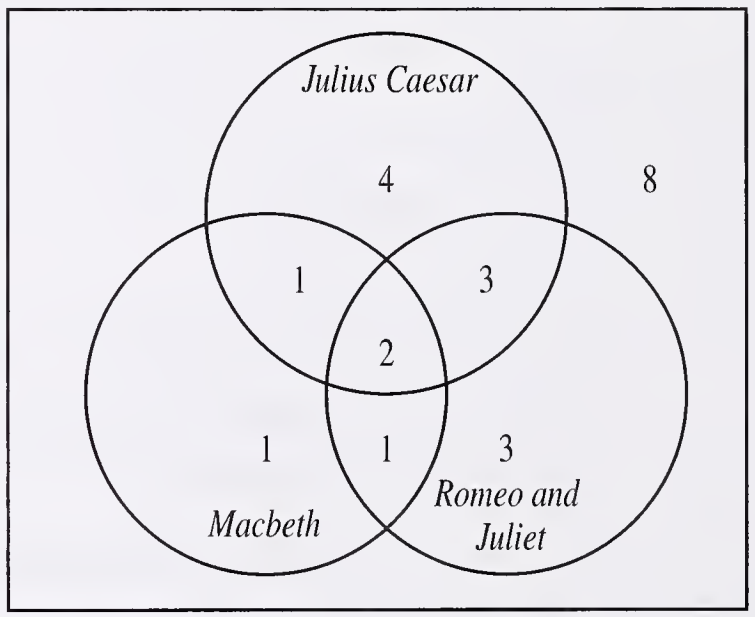
A. $\sqrt{121}$ is an irrational number.

B. $\sqrt{121}$ is an integer.

C. $\sqrt{121}$ is a real number.

D. $\sqrt{121}$ is a rational number.

3 Sarah surveyed her friends to see which of Shakespeare's plays they had read during the school year. Her results are shown in the Venn diagram below.



How many of Sarah's friends read *Julius Caesar* but **not** *Romeo and Juliet*?

A. 3

B. 4

C. 5

D. 7

4 Which of the following is the value of $a - 2b^2$ for $a = 19$ and $b = -2$?

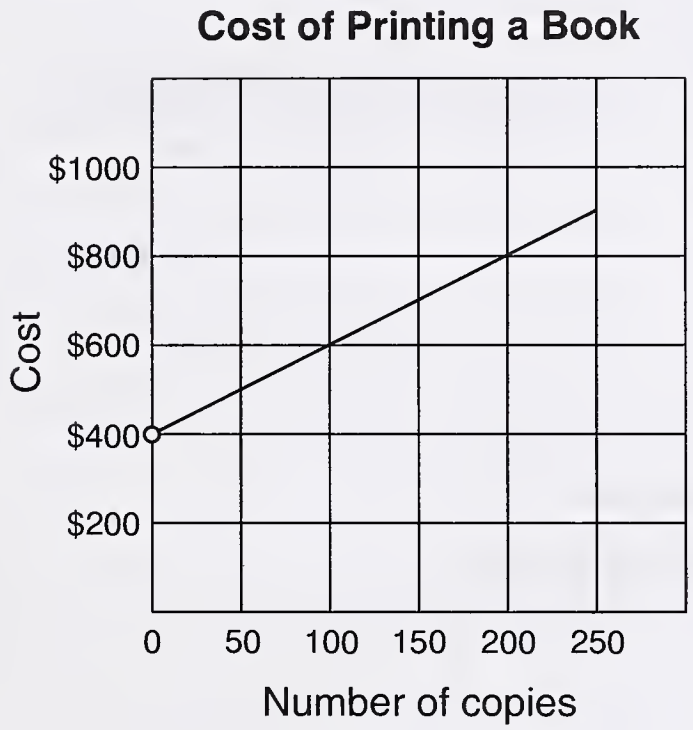
A. 3

B. 11

C. 27

D. 35

5 The cost of printing different numbers of copies of a book is shown on the graph below.



Which equation represents the cost, C, of printing n copies of the book?

A. $C = 400 + n$

B. $C = 400 + 2n$

C. $C = 400 + 50n$

D. $C = 400 + 250n$

Use the table below to answer question 6.

n	1	2	3	4	5	6
a_n	0	3	8	15	24	35

6 If the pattern in the table continues, which of the following expressions represents a_n?

A. $2^n - 1$

B. $(n - 1)^2$

C. $3(n - 1)$

D. $n^2 - 1$

7 What is the value of the expression $3(2 - 4)^2 + 3$?

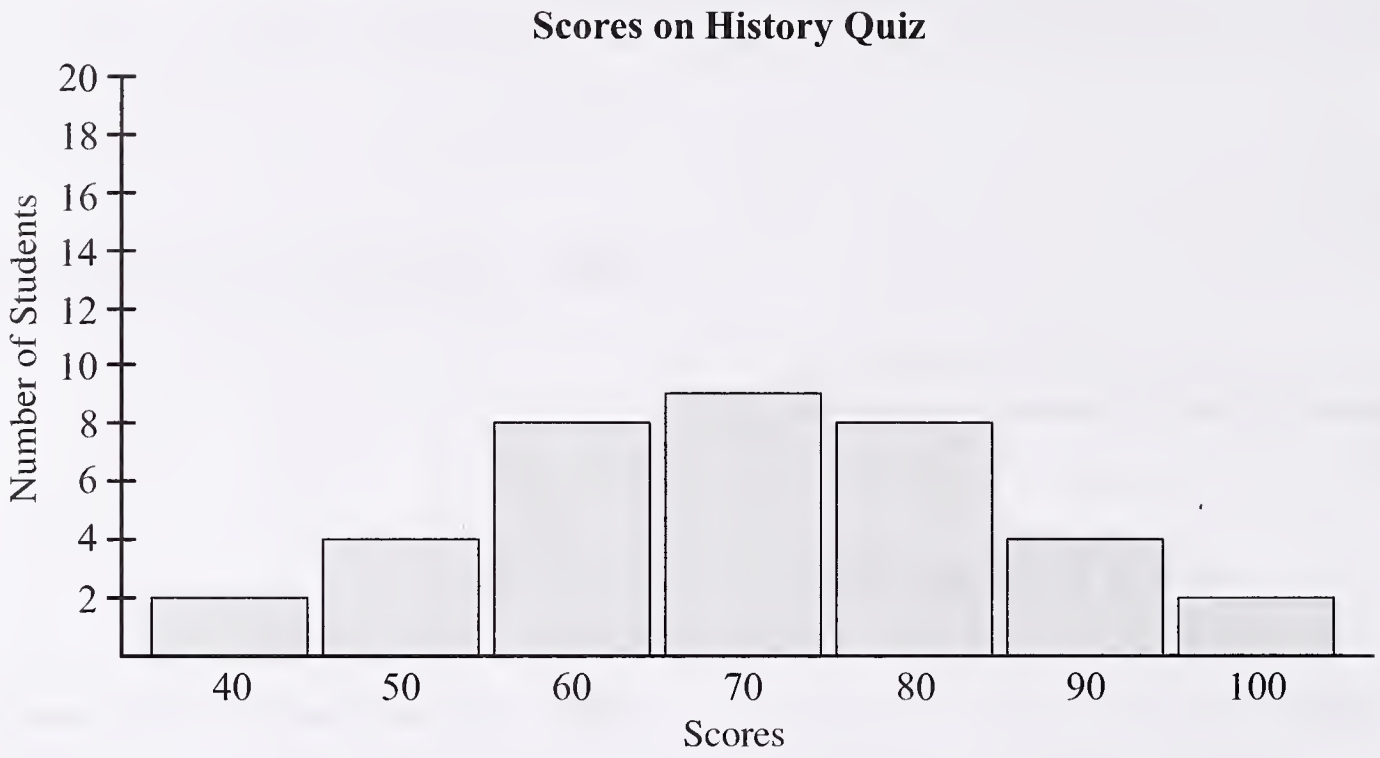
A. -33

B. -9

C. 15

D. 39

8 The bar graph below shows a group of students' scores on a history quiz.



Which of the following statements is **not** correct?

A. Thirty-seven students took the quiz.

B. The mode score was 70 on the quiz.

C. The mean and median scores on the quiz are the same.

D. Exactly 50% of the students scored 70 or higher on the quiz.

9 William and Janine have a total of $25 to pay for dinner, including 20% for tax and tip. Janine ordered a meal that cost $8.95 before tax and tip. Which of the following is the highest-priced meal that William can order, before tax and tip, without spending more than a total of $25 for both meals?

A. $5.95

B. $7.95

C. $10.95

D. $12.95

10 Which of the following statements is true?

A. $\sqrt{95} = 10$

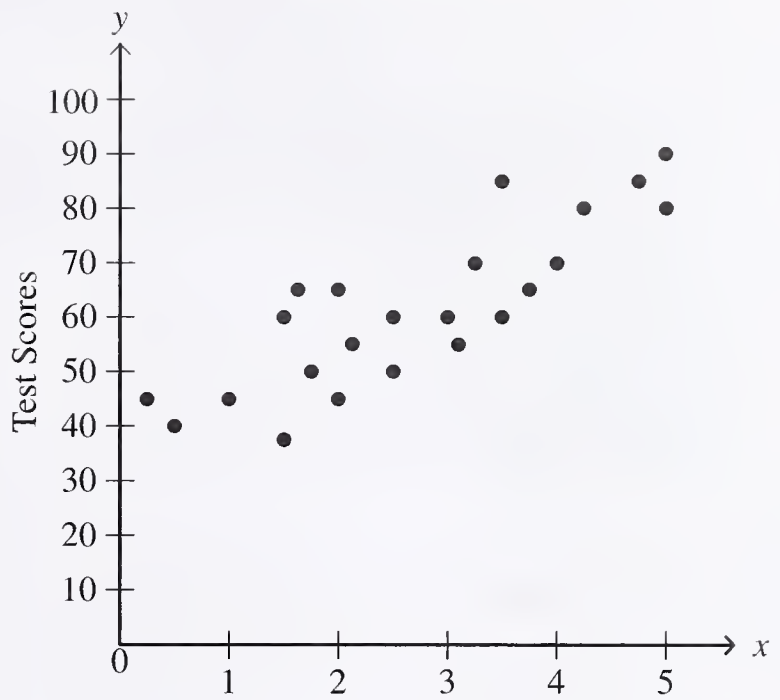
B. $\sqrt{95} < 10$

C. $\sqrt{95} > 10$

D. $\sqrt{95} < 9$

11 Ms. Kramer asked her students to report the number of hours they studied for their statistics test. The day after the test, she plotted the results on the scatterplot shown below.

Relationship of Hours of Study to Test Scores



Which of the following equations correctly approximates the line of best fit?

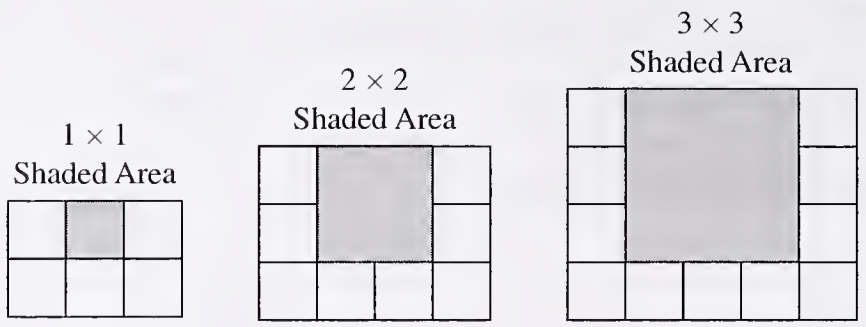
A. $y = -10x + 30$

B. $y = -10x + 60$

C. $y = 10x + 30$

D. $y = 10x + 60$

12 Each figure below shows the number of concrete blocks needed to border 3 sides of a shaded area.



If the pattern continues, which of the following expressions represents the number of concrete blocks needed to border 3 sides of an $n \times n$ shaded area?

A. $5n$

B. n^3

C. $3n$

D. $3n + 2$

Use the table below to answer question 13.

x	−5	0	1	2	3
y	a	5	2	−1	−4

13 A **linear** relationship between x and y is shown in the above table. What is the value of a?

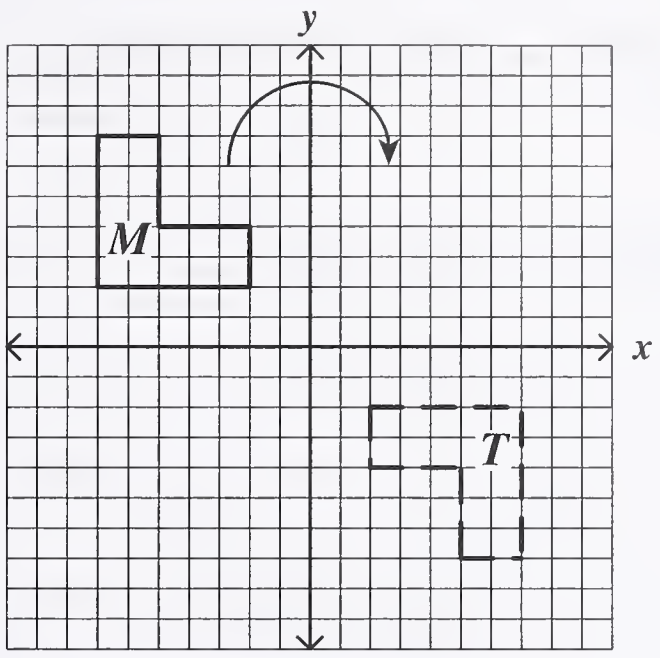
A. $a = 20$

B. $a = 3$

C. $a = -3$

D. $a = -10$

14 In the graph below, figure M was rotated clockwise about the origin to generate figure T.



What was the angle of rotation of figure M about the origin?

A. 90°

B. 180°

C. 270°

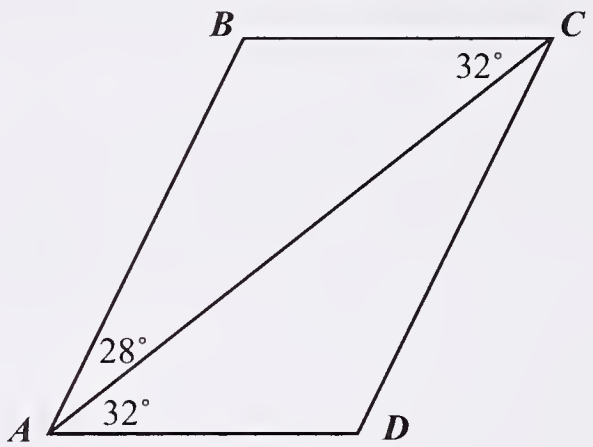
D. 360°

Questions 15 through 18 are short-answer questions. Write your answers to these questions in the boxes provided on page 2 of your Student Answer Booklet. Do not write your answers in this test booklet.

15 Solve the following equation for x.

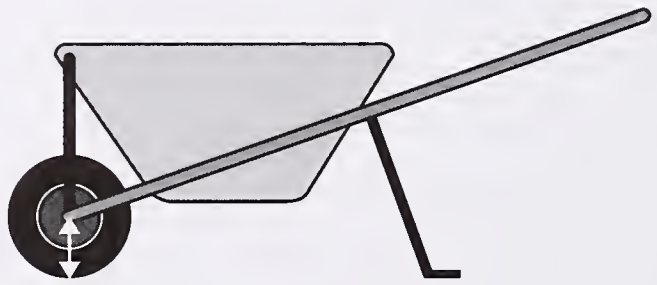
$$2x^2 + 5x - 3 = 0$$

16 In the figure shown below, $BC = 18$ inches and $AD = 18$ inches.



What is the measure of $\angle ADC$?

17 The wheel on Javier's wheelbarrow has a radius of 6 inches. Javier pushed the wheelbarrow so that the wheel rotated 3 times. How many inches did the wheel travel in 3 rotations?



radius = 6 inches

18 The area of a rectangle in square inches is represented by the expression $x^2 + 2x - 8$. The length of the rectangle is $x + 4$ inches. What is an expression for the width of the rectangle in inches?

Questions 19 through 21 are open-response questions.
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, and/or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 19 in the space provided on page 3 of your Student Answer Booklet.

19 Tom used the following method to estimate $\sqrt[3]{17}$:

- He listed the cubes of the first 4 positive integers.
- He then determined the two cubes between which 17 is located.
- Finally, he calculated the cube roots of the two cubes he found in the previous step to determine the two integers between which $\sqrt[3]{17}$ is located.

a. List the cubes of the first 4 positive integers. What are the two cubes between which 17 is located?

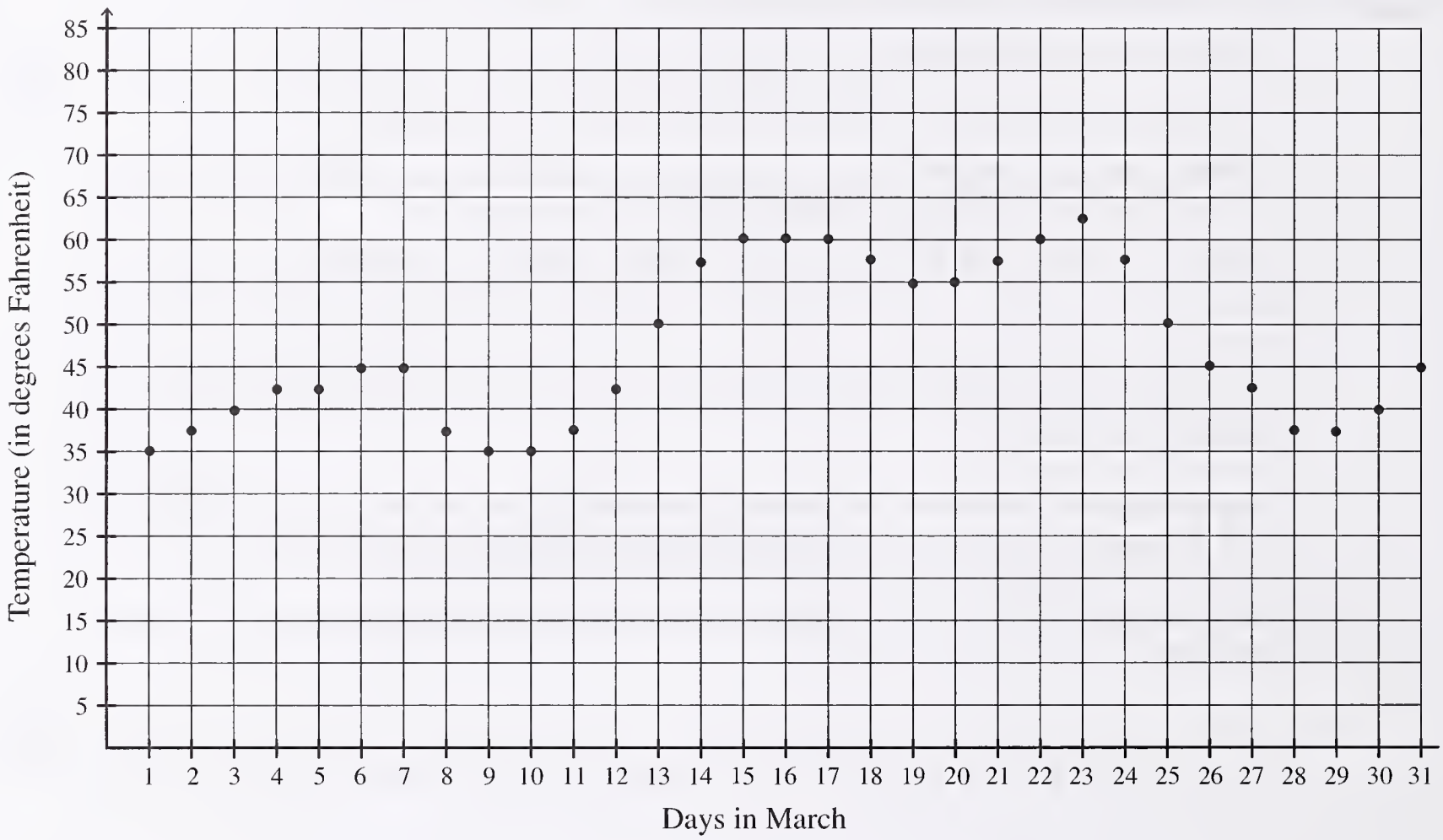
b. Calculate the cube roots of the two cubes you found in the previous step. What are the two integers between which $\sqrt[3]{17}$ is located? Show your work or explain how you obtained your answer.

c. Using this method, show how Tom would determine the two integers between which $\sqrt[4]{17}$ is located. Show your work or explain how you obtained your answer.

d. Which number, $\sqrt[3]{17}$ or $\sqrt[4]{17}$, is greater? Show your work or explain how you obtained your answer.

Write your answer to question 20 in the space provided on page 4 of your Student Answer Booklet.

20 The scatterplot shown below represents the high daily temperatures in degrees Fahrenheit, in March, for a town in Massachusetts.



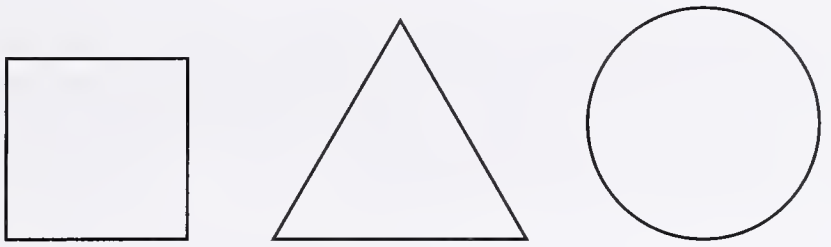
a. What is the **median** temperature from March 10 to March 18? Include the temperatures for March 10 and March 18 in your computation. Show your work or explain how you obtained your answer.

b. What is the **mode** of the temperatures from March 10 to March 18? Include the temperatures for March 10 and March 18 in your computation. Show your work or explain how you obtained your answer.

c. What is the **range** of temperatures from March 10 to March 18? Include the temperatures for March 10 and March 18 in your computation. Show your work or explain how you obtained your answer.

Write your answer to question 21 in the space provided on page 5 of your Student Answer Booklet.

21 In the figures shown below, the perimeters of the square and the equilateral triangle are each 24 inches. The circumference of the circle is also 24 inches.



Perimeter = 24 inches

Perimeter = 24 inches

Circumference = 24 inches

a. What is the area of the square? Be sure to include units of measure in your answer. Show your work or explain how you obtained your answer.

b. What is the area of the equilateral triangle? Be sure to include units of measure in your answer. Show your work or explain how you obtained your answer.

c. What is the area of the circle? Be sure to include units of measure in your answer. Show your work or explain how you obtained your answer.

d. List the three shapes in order from **smallest** area to **largest** area.

e. The perimeter of a regular hexagon is 24 inches. Based on this information, where on your list from part d would you predict it would be placed? Explain your reasoning.

Mathematics

SESSION 2

You may use a calculator during this session.

DIRECTIONS

This session contains eighteen multiple-choice questions and three open-response questions. Mark your answers to these questions in the spaces provided on pages 6 through 8 of your Student Answer Booklet.

22 Leena works for the park service. She wanted to estimate the population of a particular species of fish in a park lake. She obtained samples on which to base her estimate by casting a net in each of seven locations in the lake, counting the fish she caught, and then releasing the fish. Her results are shown in the table below.

Results of Fish Sampling

Location	1	2	3	4	5	6	7
Number of Fish Caught	18	12	18	11	9	13	17

What is the **mean** number of fish caught?

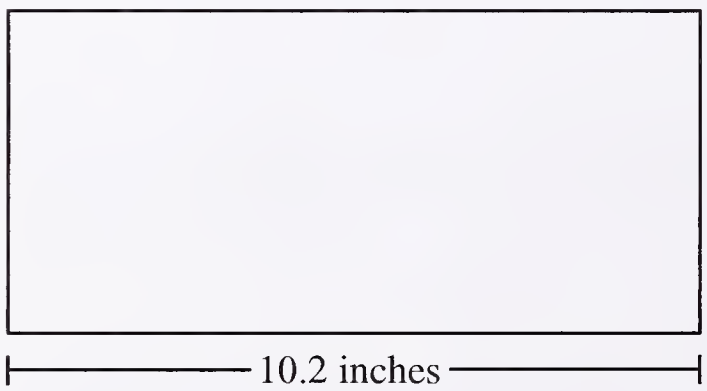
A. 13

B. 14

C. 17

D. 18

23 The rectangle shown below has an area of 51 square inches and a length of 10.2 inches.



What is the perimeter of the rectangle?

A. 15.2 inches

B. 20.2 inches

C. 30.4 inches

D. 40.8 inches

24 The distance from Boston, Massachusetts to Princeton, New Jersey is approximately 418 kilometers. What is the approximate distance in miles between Boston and Princeton? (1 mile $\approx$ 1.609 kilometers)

A. 160 miles

B. 260 miles

C. 500 miles

D. 670 miles

25 Approximately $\frac{1}{3}$ of Hamilton High's 1153 students leave campus for lunch. Which of the following is **closest** to the number of students who do **not** leave campus for lunch?

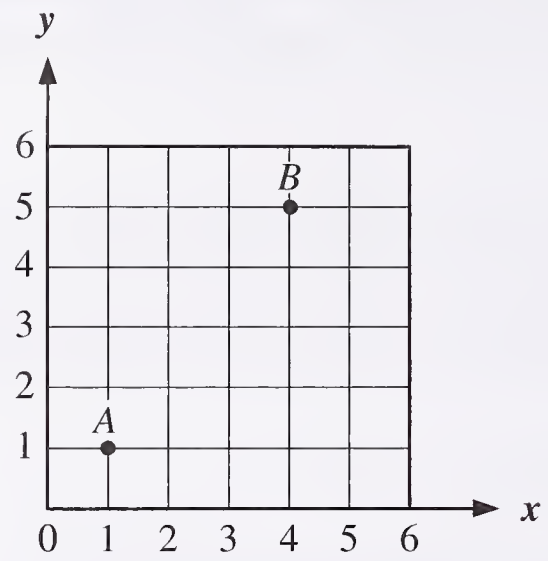
A. 400

B. 600

C. 700

D. 800

Use the grid below to answer question 26.



26 Two points, A and B, are located on the grid above. What is the distance between A and B?

A. $3\sqrt{2}$

B. $4\sqrt{2}$

C. 5

D. 6

27 A journalist is interested in estimating the percentage of Massachusetts residents who support the use of state tax dollars to pay for a new civic center in Springfield. Which of the following would result in the **most** reliable estimate?

A. Survey 100 randomly selected civic center board members.

B. Survey 100 randomly selected Boston residents.

C. Survey 100 randomly selected Springfield residents.

D. Survey 100 randomly selected Massachusetts residents.

28 The formula $t = \frac{\sqrt{d}}{4} + \frac{d}{1100}$ is used to calculate the number of seconds, t, it takes to hear a splash after dropping an object into a well that is d feet deep. Which is **closest** to the number of seconds it takes to hear a splash after dropping an object into a well that is 200 feet deep?

A. 3.55 seconds

B. 3.72 seconds

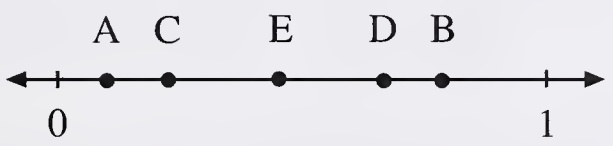
C. 7.25 seconds

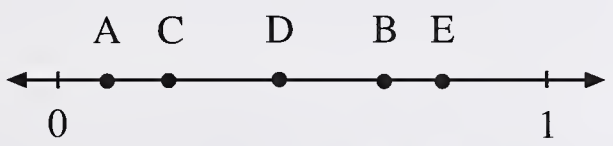
D. 50.18 seconds

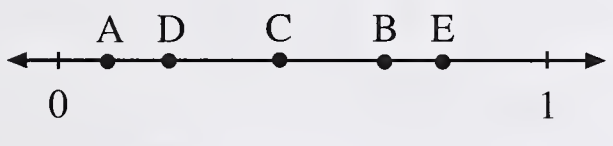
29 The table below shows the location of five selected points on a number line.

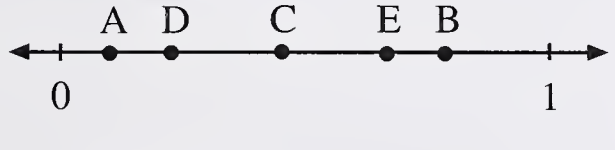
Point	Location on the Number Line
A	0.13
B	$\frac{5}{8}$
C	$\frac{\sqrt{3}}{4}$
D	25×10^{-2}
E	$\frac{\pi}{4}$

Based on the the data in the table above, which of the following number lines **best** represents the correct location of all five points?

A.


B.


C.


D.


Use the equation below to answer question 30.

$$y = 2^x$$

30 As the value of x becomes negative and continues to decrease, what happens to the value of y?

A. y becomes negative

B. y gets closer to 1

C. y gets closer to 0

D. y gets closer to x

Question 31 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, and/or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 31 in the space provided on page 6 of your Student Answer Booklet.

31 Ms. Martínez is promoting a concert for a rock group called The Algo Rhythms. The concert will be held at the Worcester Centrum Centre, and it is anticipated that tickets for all 10,000 seats will be sold. Ms. Martínez decided to charge $50 for reserved seats and $30 for general admission seats. Ms. Martínez's total expenses for the band's appearance are $420,000.

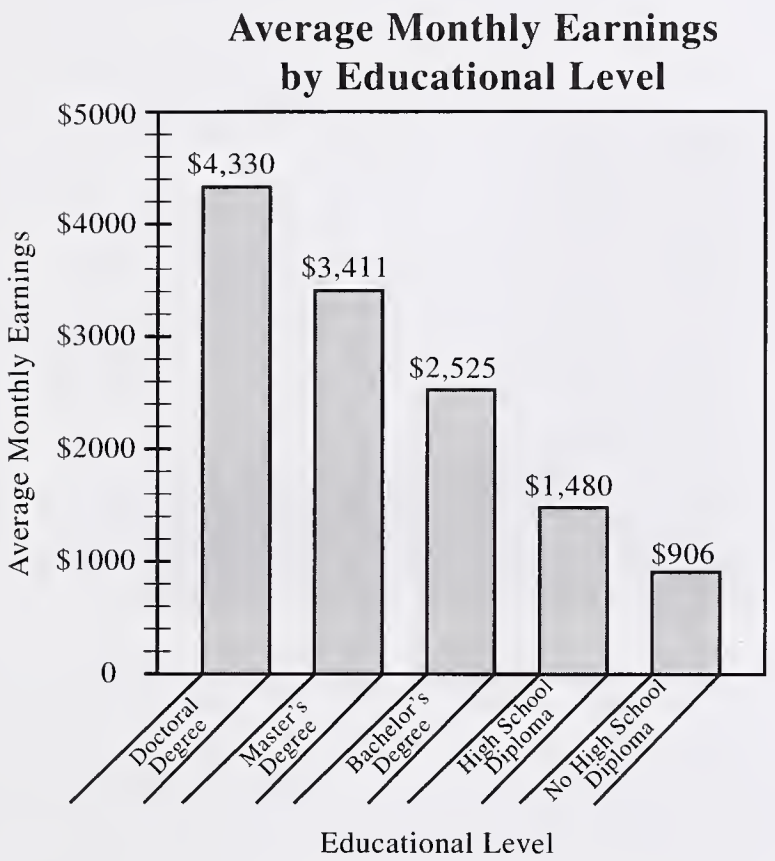
a. Suppose Ms. Martínez sold 2000 reserved seats and 8000 general admission seats. Based on this information, will she make enough money to pay her total expenses? Show your work or explain how you obtained your answer.

b. Write an equation that represents the amount of money Ms. Martínez needs to collect from the sale of, *r,* reserved seats and, *g,* general admission seats in order to pay her total expenses.

c. What is the **minimum** number of tickets Ms. Martínez must designate as reserved if she wants to collect enough money from total ticket sales to pay her total expenses? Show your work or explain how you obtained your answer.

Mark your answers to questions 32 through 40 in the spaces provided on page 7 of your Student Answer Booklet.

32 The graph below shows the relationship between a person's educational level and average monthly earnings.



Source: *United States Bureau of Labor Statistics.*

According to the graph, which is **closest** to the difference in the yearly earnings of a person with a Master's degree and the yearly earnings of a person with no high school diploma?

A. $25,000

B. $30,000

C. $35,000

D. $40,000

33 What is the effect on the area of a circle if the radius of the circle is doubled?

A. The area is multiplied by 2.

B. The area is multiplied by 4.

C. The area is multiplied by 8.

D. The area stays the same.

34 Youn Mee usually drives the 600 miles from Boston, Massachusetts to Pittsburgh, Pennsylvania in 12 hours. If she increases her average speed by 10 miles per hour, how much time will the trip take?

A. 5 hours

B. 8 hours

C. 10 hours

D. 15 hours

35 Tim is constructing a triangle with sides measuring 3 inches and 6 inches. Which could **not** be the length of the third side?

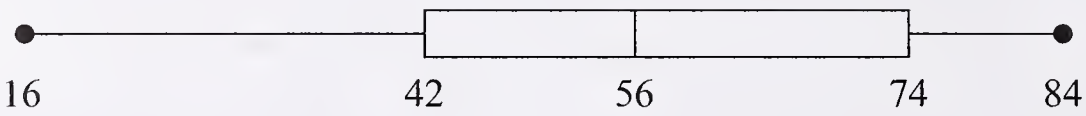
A. 2 in.

B. 4 in.

C. 6 in.

D. 8 in.

36 The box-and-whisker plot shown below represents 600 scores on a district geometry test.



How many students scored between 42 and 56?

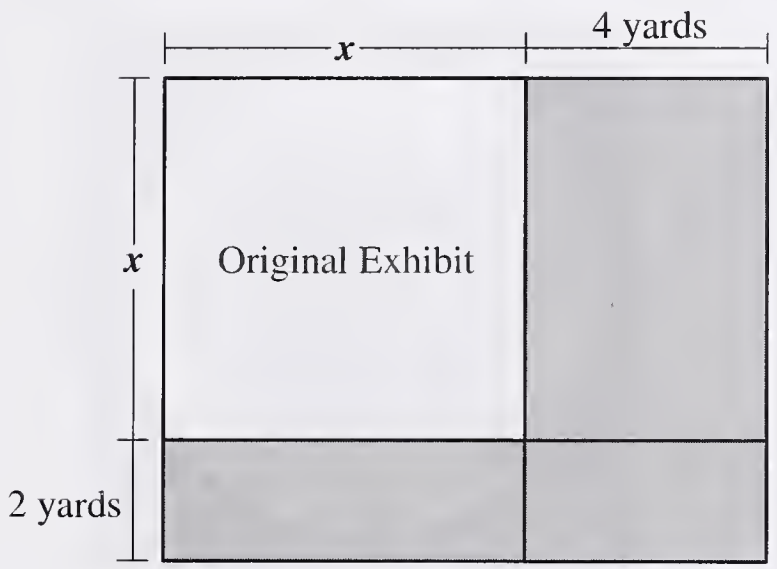
A. 84

B. 150

C. 300

D. 450

37 The drawing below shows the recently expanded exhibit at the local zoo. The original exhibit was in the shape of a square with a side of length x. The expanded exhibit is in the shape of a rectangle. The shaded portion of the drawing represents the exhibit's expansion.



The total area of the original exhibit plus the expansion is now 80 square yards. What was the area of the original exhibit?

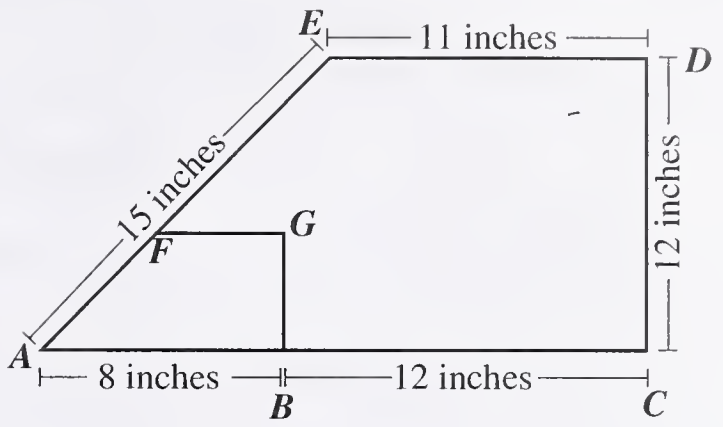
A. 6 square yards

B. 16 square yards

C. 36 square yards

D. 40 square yards

38 In the figure below, quadrilateral $ACDE$ is similar to quadrilateral $ABGF$.



What is the length of $\overline{AF}$?

A. 6.0 inches

B. 6.4 inches

C. 10.0 inches

D. 10.7 inches

39 The chart below shows the area, in square miles, of each of the six New England states.

Area of New England States

State	Area (square miles)
Rhode Island	1,214
Connecticut	5,009
Massachusetts	8,093
New Hampshire	9,304
Vermont	9,609
Maine	33,215

Source: *World Almanac 2000.*

How many New England states have an area less than the **mean** area of all six New England states?

A. 1

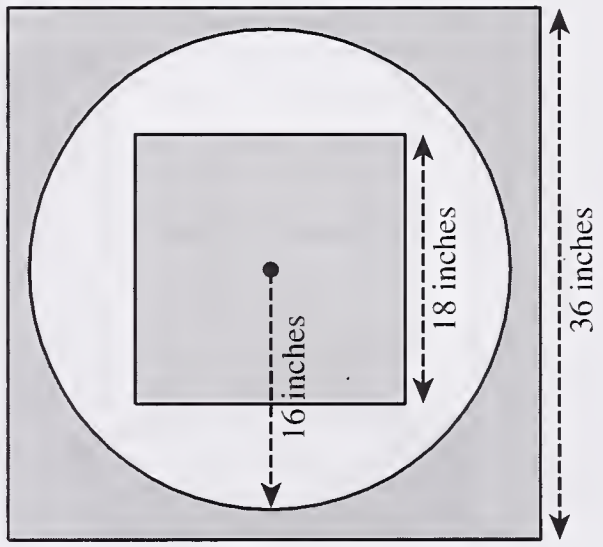
B. 3

C. 4

D. 5

40 The figure below shows a dart board at a carnival.

- The large square has sides that measure 36 inches.
- The small square has sides that measure 18 inches.
- The circle has a radius of 16 inches.



DART BOARD

Wearing a blindfold, Taylor throws a dart that hits the board. What is the probability that the dart will hit the unshaded area of the board?

A. 0.25

B. 0.37

C. 0.62

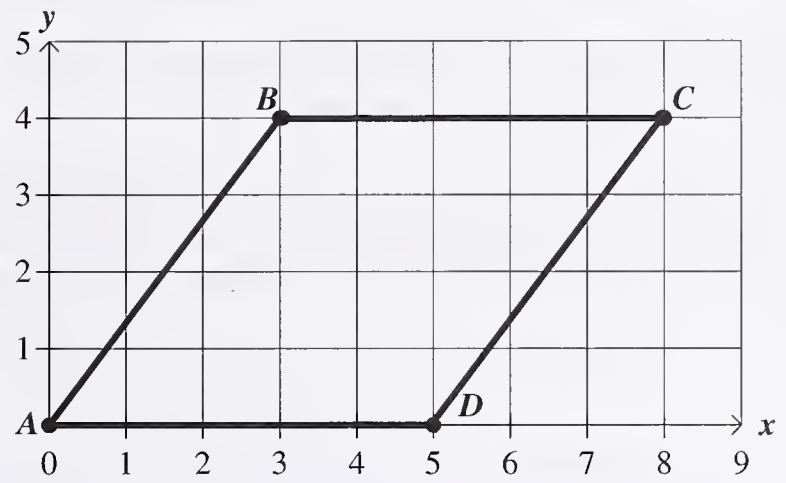
D. 0.87

Questions 41 and 42 are open-response questions.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, and/or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 41 in the space provided on page 7 of your Student Answer Booklet.

41 The graph of rhombus *ABCD* is shown below.



a. What is the slope of diagonal $\overline{AC}$ of the rhombus? Show your work or explain how you obtained your answer.

b. What is the slope of diagonal $\overline{BD}$ of the rhombus? Show your work or explain how you obtained your answer.

c. What is the equation of the line containing diagonal $\overline{AC}$ of the rhombus? Show your work or explain how you obtained your answer.

d. What is the relationship between the line containing diagonal $\overline{AC}$ and the line containing diagonal $\overline{BD}$ of the rhombus? Show your work or explain how you obtained your answer.

Write your answer to question 42 in the space provided on page 8 of your Student Answer Booklet.

42 Shanika has a part-time job selling candy. Shanika is paid $25.00 per week plus $3.00 for each box of candy she sells.

a. Shanika sold 12 boxes of candy in one week. What was Shanika's total weekly pay? Show your work or explain how you obtained your answer.

b. One week Shanika was paid a total of $109.00. How many boxes of candy did Shanika sell that week? Show your work or explain how you obtained your answer.

c. Write an equation that represents the relationship between Shanika's weekly pay, P, and the number of boxes, B, of candy sold in one week.

d. During her six-week summer break, Shanika hopes to earn **at least** $500.00. What is the average number of boxes of candy Shanika must sell each week in order to earn at least $500.00? Show your work or explain how you obtained your answer.

December Retest
Massachusetts Comprehensive Assessment System
Grade 10 Mathematics Reference Sheet

AREA FORMULAS

triangle .....$A = \frac{1}{2}bh$

rectangle .....$A = bh$

square .....$A = s^2$

trapezoid.....$A = \frac{1}{2}h(b_1 + b_2)$

CIRCLE FORMULAS

$C = 2\pi r$

$A = \pi r^2$

LATERAL SURFACE AREA FORMULAS

cube .....$LA = 4s^2$
regular prism .....$LA = 2(hw) + 2(lh)$
right circular cylinder.....$LA = 2\pi rh$
right circular cone .....$LA = \pi r\ell$
right square pyramid .....$LA = 2s\ell$
(ℓ = slant height)

TOTAL SURFACE AREA FORMULAS

cube.....$SA = 6s^2$
regular prism.....$SA = 2(lw) + 2(hw) + 2(lh)$
sphere.....$SA = 4\pi r^2$
right circular cylinder .....$SA = 2\pi r^2 + 2\pi rh$
right circular cone.....$SA = \pi r^2 + \pi r\ell$
right square pyramid.....$SA = s^2 + 2s\ell$
(ℓ = slant height)

VOLUME FORMULAS

cube.....$V = s^3$
(s = length of an edge)

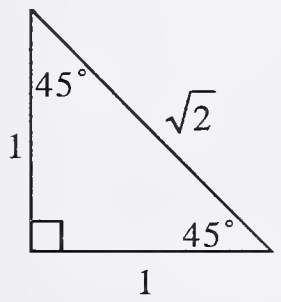
regular prism.....$V = lwh$ or $V = Bh$
(B = area of the base)

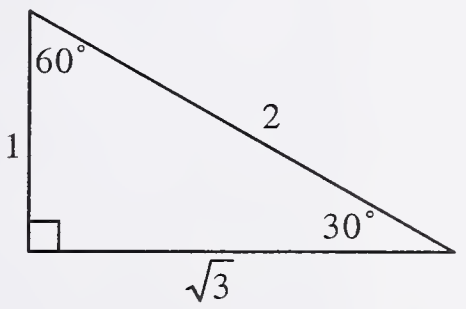
sphere.....$V = \frac{4}{3}\pi r^3$

right circular cylinder .....$V = \pi r^2 h$

right circular cone.....$V = \frac{1}{3}\pi r^2 h$

right square pyramid.....$V = \frac{1}{3}s^2 h$





ISBN 999-830-615-9

Reporting Category, Learning Standard, and Correct Answer
Grade 10 Mathematics
December 2001 Retest

Item No.	Page No.	Reporting Category	Learning Standard	Correct Answer (MC/SA)*
1	4	*Geometry*	10.G.3	C
2	4	*Number Sense and Operations*	8.N.2	A
3	4	*Data Analysis, Statistics, and Probability*	8.D.2	C
4	5	*Patterns, Relations, and Algebra*	8.P.2	B
5	5	*Patterns, Relations, and Algebra*	10.P.7	B
6	5	*Patterns, Relations, and Algebra*	10.P.1	D
7	5	*Number Sense and Operations*	10.N.2	C
8	6	*Data Analysis, Statistics, and Probablility*	10.D.1	D
9	7	*Number Sense and Operations*	8.N.10	C
10	7	*Number Sense and Operations*	10.N.1	B
11	7	*Data Analysis, Statistics, and Probability*	10.D.2	C
12	8	*Patterns, Relations, and Algebra*	10.P.1	D
13	9	*Patterns, Relations, and Algebra*	10.P.1	A
14	9	*Geometry*	10.G.9	B
15	10	*Patterns, Relations, and Algebra*	10.P.5	1/2 or –3
16	10	*Geometry*	10.G.4	120°
17	10	*Measurement*	10.M.1	36 π
18	10	*Patterns, Relations, and Algebra*	10.P.4	$(x - 2)$
19	11	*Number Sense and Operations*	10.N.1	
20	12	*Data Analysis, Statistics, and Probability*	10.D.1	
21	13	*Measurement*	10.M.1	
22	14	*Data Analysis, Statistics, and Probability*	8.D.3	B
23	14	*Measurement*	10.M.1	C
24	15	*Measurement*	8.M.4	B
25	15	*Number Sense and Operations*	8.N.10	D
26	16	*Geometry*	10.G.7	C
27	16	*Data Analysis, Statistics, and Probability*	10.D.3	D
28	16	*Number Sense and Operations*	10.N.2	B
29	17	*Number Sense and Operations*	10.N.1	C
30	17	*Patterns, Relations, and Algebra*	10.P.1	C
31	18	*Patterns, Relations, and Algebra*	10.P.8	
32	19	*Number Sense and Operations*	8.N.12	B
33	19	*Measurement*	10.M.3	B
34	19	*Patterns, Relations, and Algebra*	10.P.7	C
35	19	*Geometry*	10.G.1	A
36	20	*Data Analysis, Statistics, and Probability*	10.D.1	B
37	21	*Patterns, Relations, and Algebra*	10.P.5	C
38	21	*Geometry*	10.G.4	A
39	22	*Data Analysis, Statistics, and Probability*	10.D.1	D
40	22	*Data Analysis, Statistics, and Probability*	8.D.4	B
41	23	*Geometry*	10.G.7	
42	24	*Patterns, Relations, and Algebra*	10.P.7	

*Answers are provided here for multiple-choice and short-answer items only. Scoring rubrics for open-response items will be posted to the Department's website later this winter.

ISBN 999-8189-03-9
9 789998 189034

1 2 3 4 5 6 7 8 9 10 11 12 A B C D E